subsequent applications. Claims 2, 3, 7-9, 12, and 13 have also been canceled. Claims 35-39 have been added. Reexamination and reconsideration of pending claims 1, 4-6, 10, 11, 14, 15, 20-28, and 31-39 are respectfully requested.

Presently Claimed Invention

Implantable hearing devices and methods of improving hearing in a human subject are claimed. An implantable hearing device (10) comprises a transducer (22,24) and a connecting member (226A, 226B) that elastically couples a component of a human ear (30,34) to the transducer. The connecting member comprises a resilient biasing mechanism that has a resonant frequency below about 500 hertz.

Cited Art

Lenkauskas USPN 5,498,226 describes an implantable hearing device that uses an ossicular wire spring prosthesis (14) to couple a tympanic membrane (16, 20) to a fixed electronic/transducer assembly (22). The electronic assembly transmits an amplified signal to another fixed transducer (30) which is connected to a piston (32). The piston vibrates against a facie cover (42) to transmit the amplified signal to parilymph fluid of an inner ear.

Schaefer USPN 4,729,366 describes an implantable hearing device that uses stiff wire connections (208A, 208B) to couple a malleus (30) with an input transducer (22) and an output transducer (24) with a stapes (52).

Formal Matters

Claims 1-13 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Claims 1, 4, and 10 have been amended to recite "adapted to" language as requested by the Examiner. Claims 3, 8, 9, and 13 have also been amended and placed in independent form as new claims 36-39 respectively. As the amended claim language is now clear, Applicants respectfully request that the rejections under 35 U.S.C. §112, second paragraph, be removed and that claims 36-39 be allowed.

Substantive Rejections - 35 U.S.C. §102(b)

Claims 1-2, 10-12, 14, 20, and 22 were rejected under 35 U.S.C. §102(b), as allegedly being anticipated by Lenkauskas. These rejections are traversed in part and overcome in part as follows.

Independent claim 1, as amended, recites an implantable hearing device comprising a transducer and a connecting member. Specifically, the connecting member comprises a resilient biasing mechanism having a resonant frequency below about 500 hertz. (Support for this amendment can be found on page 12, lines 4-28 of the originally filed specification.) This element is not shown in the cited art. In fact, Applicants have failed to identify even a remote suggestion for a resilient biasing mechanism having a resonant frequency below about 500 hertz in the Lenkauskas reference.

The resilient biasing mechanism having a resonant frequency below about 500 hertz of claim 1 can provide significant advantage over the Lenkauskas device. The claimed resilient biasing mechanism having a low resonance of below about 500 hertz allows passage of high voice frequencies above 100 hertz without signal degradation and at the same time provides constant low force that still allows for stretching. It is important that the resilient biasing mechanism accommodate small stretches since the positional relationship between the hearing device and the subject's anatomy often shifts post-implantation. Thus, a low resonance biasing mechanism ensures high fidelity and performance of sound reproduction since the low resonance design allows the biasing mechanism to remain in tact during positional changes. As the resilient biasing mechanism having a resonant frequency below about 500 hertz has not been shown in the cited art, claim 1 is allowable.

Independent claims 10, 14, and 20 have also been amended to recite that the connecting member comprises a resilient biasing mechanism having a resonant frequency below about 500 hertz. Hence, these claims should be allowable for many of the reasons given above regarding claim 1.

Independent claim 22 recites an implantable hearing device comprising an electromagnetic unit having a diaphragm, wherein a connecting member elastically couples the diaphragm to a component of a middle ear. This elastic coupling of the diaphragm is not described or suggested in the Lenkauskas reference. Lenkauskas only shows a fixed oscillator

that connects an amplified signal to a piston which vibrates the parilymph fluid of an inner ear. As elastic coupling between a diaphragm and a component of a middle ear is not shown in the Lenkauskas device, claim 22 is allowable.

Substantive Rejections - 35 U.S.C. §103(a)

Claims 4-7, 15, 21, 23-28, and 31-34 were rejected under 35 U.S.C. §103(a), as allegedly being obvious over Schaefer in view of Lenkauskas. These rejections are traversed in part and overcome in part as follows.

Independent claim 4, as amended, recites an implantable hearing device comprising an amplifier, a first and second transducer, and a first and second connecting member. The first connecting member elastically couples a tympanic membrane to the first transducer and the second connecting member elastically couples the second transducer to an oval window. Specifically, each connecting member comprises a resilient biasing member having a resonant frequency below about 500 hertz. Therefore, claim 4 should be allowable for many of the same reasons given above for claim 1.

Further, even if *assuming arguendo* that the cited references are combined, the resulting combination would not be the presently claimed invention. The Schaefer wire connections modified by the Lenkauskas device would result only in a single spring coupling between a malleus and an input transducer. The other side of the hearing device would be connected to another fixed transducer which in turn would be connected to a piston. Moreover, Applicants do not even remotely see a description or suggestion in the cited art for elastically coupling an output transducer to a middle ear with a second resilient biasing member, as presently claimed. As a resilient biasing member having a resonant frequency below about 500 hertz and a second resilient biasing member which elastically couples a second transducer to an oval window are not shown or suggested by any reasonable combination of the cited references, claim 4 is allowable.

Independent claims 15 and 21 have also been amended to recite that first and second connecting members each comprise a resilient biasing member having a resonant frequency below about 500 hertz. As such, these claims should be allowable for the same reasons given above regarding claim 4.

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Independent claims 25 and 27 recite elastically coupling a diaphragm to an inner ear structure with a connecting member. Hence, these claims should be allowable for substantially the same reasons stated above for claim 22.

Independent claims 31 and 33 recite elastically coupling a coil to a magnet with a connecting member. Applicant fails to see a description or suggestion for such an embodiment as claimed in the cited art. Accordingly, claims 31 and 33 are allowable.

In addition to relying on allowable base claims, the dependent claims are allowable in their own right. For example, the cited art does not show or suggest the use of magnetism for coupling the connecting member to a diaphragm and a structure of a middle ear as recited in claim 23. Magnetic coupling is advantageous because it provides automatic and effective alignment without the complications involved in securing mechanical couplings. Absent a showing of the elements claimed in claims 1, 4-6, 10, 11, 14, 15, 20-28, and 31-34, Applicant respectfully requests that the rejections be removed, and that the claims be allowed.

Added Claim

Applicants have added dependent claim 35 to more fully claim the present invention. Support for this preferred embodiment can be found on page 12, lines 4-28 of the originally filed specification.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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